4.6 Gabion

GA

Definition

Gabions are large, multi-celled, welded wire or rectangular wire mesh boxes, used in channel revetments, retaining walls, abutments, and check dams.

Purpose

Rockfilled baskets, properly wired together, form flexible monolithic building blocks used for construction of erosion control structures. Gabions are used to stabilize steep or highly erosive slopes.

Design Criteria

Construction plans and drawings should be prepared by professionals familiar with the use of gabions. Erosion and sediment control construction design should ensure that foundations are properly prepared to receive gabions, that the gabion structure is securely “keyed” into the foundations and abutment surfaces, and that rock used is durable and adequately sized to be retained in the baskets.

Construction Specifications

How the Gabion is Filled

The gabion is normally filled with hand-sized 4- to 8-inch pieces of stone, usually dumped into the basket mechanically. The filled gabion then becomes a large, flexible and permeable building block from which a broad range of structures may be built. This is done by setting and wiring individual units together in courses and filling them in place.

Corrosion Resistance of Gabions

The wire mesh or welded wire used in gabions is heavily galvanized. For highly corrosive conditions, a polyvinyl chloride (PVC) coating must be used over the galvanizing. Such treatment is an economical solution to deterioration of the wire near the ocean, in some industrial areas, in polluted streams, and in acidic soils such as muck and peat.

Flexibility

An outstanding advantage of the gabion is its flexibility. This property is especially important when a structure is on unstable ground or in areas where scour from waves or currents can undermine it.

Durability

Gabions are durable because they support plant growth, which develops a living coating for the wire mesh and stones. Frequently, the wire basket is only needed for the first few years, because the voids between the individual stones fill with soil, silt, and roots, which act as a bonding agent for the stones.

Strength

Steel wire baskets have the strength and flexibility to withstand forces generated by water and earth masses. The pervious nature of the gabion allows it to absorb and dissipate much of the energy developed. A compact gabion structure may remain long after a massive rigid structure fails.

Permeability

Hydrostatic heads do not develop behind the gabion wall. The wall is pervious to water and stabilizes a slope by the combined action of draining and retaining. Drainage is accomplished by gravity and by evaporation as the porous nature permits air circulation through the structure. Moreover, as plant growth invades the structure, transpiration further assists in removing moisture from the backfill. This system is much more efficient than weep holes in standard masonry walls.

Economy

Gabion installations are more economical than rigid or semi-rigid structures for a number of reasons. The following are among the more important ones.

- Little maintenance is required.
- Gabion construction is simple and requires no skilled labor.
- Preliminary foundation preparation is unnecessary. The surface needs only to be reasonably level and smooth.
- Since gabions are porous, no costly drainage provision is required.

Landscaping

Because gabions permit the growth of natural vegetation and maintain the natural environment of the area, they provide attractive and natural building blocks for decorative landscaping.

Gabions can be used effectively and economically in parks, along highways, and around bridge approaches to create walkways, rock gardens, patios, and terraces. Not only can gabions improve property aesthetics, beautifying the banks of lakes and ponds and accenting trees and other plantings, they can be used as successful sound barriers. The application of gabions in decorative landscaping is limited only by the ingenuity of the landscaper. Typical installations include:

- River Training and Flood Control
  - Gabion Aprons
  - Longitudinal Works
  - Training Walls
  - Revetments
  - Bank Paving
  - Counterforts
  - Drop Structures or Weirs
  - Spurs, Spur Dikes, or Groins
- Channel Linings
- Retaining Walls
- Bridge Abutments and Wings
- Marinas and Boat Ramps
- Culvert Headwalls and Outlet Aprons
- Shore and Beach Protection

Maintenance

Periodic inspections should be performed for signs of undercutting or excessive erosion at transition areas.

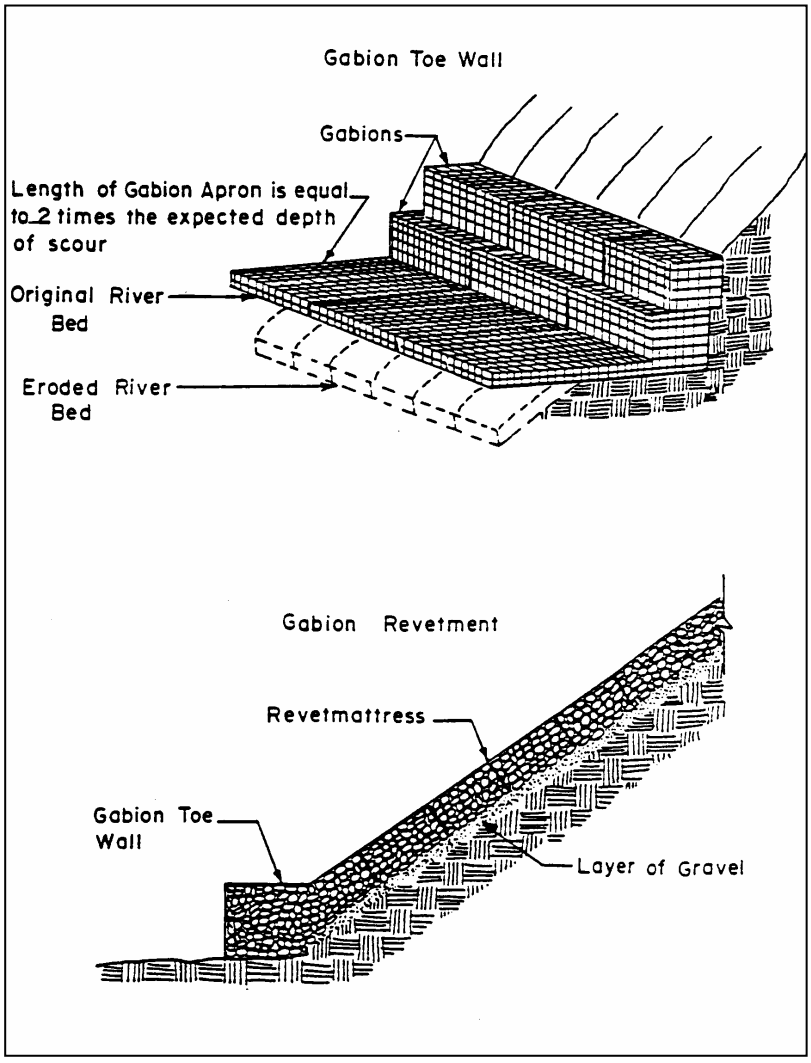

Figure 4.6.1 Gabion Typical